

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : FUJI PHOTO FILM CO LTD

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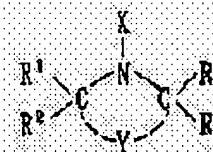
(72)Inventor : TAGUCHI KEIICHI

(54) IMAGE FORMING MATERIAL AND METHOD FOR FORMING IMAGE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an ink jet recording sheet, an ink jet recording liquid having excellent optical fastness and a method for forming an image.

SOLUTION: An ink jet recording sheet contains a compound represented by a formula (wherein Y is a nonmetallic atom group necessary to form 5 to 7-membered ring, X is an alkyl group, an alkenyl group, an alkynyl group, an aryl group, an acyl group, a sulfonyl group, sulfinyl group, an oxyradical group, an alkoxy group, an aryloxy group, acyloxy group or a hydroxyl group, and R to R are each a hydrogen atom or an alkyl group.) and provided on a support in an ink receptive layer. An ink jet recording ink uses the compound. The method for forming an image uses the liquid.



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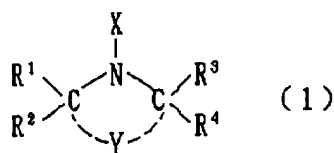
CLAIMS

[Claim(s)]

[Claim 1] An ink jet record form characterized by containing a compound expressed with the following general formula (I) all over an ink absorbing layer in which it was prepared on a base material.

[Formula 1]

一般式 (I)



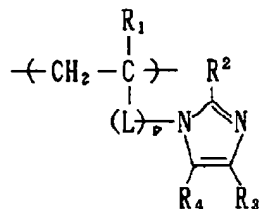
Y expresses a nonmetal atom group required to form C and 5 - 7 member ring with N among a formula. X expresses an alkyl group, an alkenyl radical, an alkynyl group, an aryl group, an acyl group, a sulfonyl group, a sulfinyl group, an oxy-radical radical, an alkoxy group, an aryloxy group, an acyloxy radical, or a hydroxyl group. R1, R2, and R3 And R4 You may differ, even if mutually the same, and a hydrogen atom or an alkyl group is expressed respectively. Here, R1 -R4 and any two radicals in Y may join together mutually, and may form 5 - 7 member ring.

[Claim 2] The ink jet recording paper according to claim 1 which a compound of the above-mentioned general formula (I) has an anionic water solubility radical, and is characterized by the number of total carbon being 20 or less.

[Claim 3] an unit expressed with an ink absorbing layer by the following general formula (II) at least -- more than 60 mol % -- an ink jet record form according to claim 1 or 2 characterized by containing an included polymer mordant.

[Formula 2]

一般式 (II)



The inside of a formula, R1, R2, R3, and R4 The hydrogen atom or the alkyl group could be expressed independently, respectively, and you may branch also with the straight chain. L expresses a divalent connection radical. p expresses 0 or 1.

[Claim 4] Record liquid for aqueous ink jet record characterized by containing a compound expressed with the above-mentioned general formula (I) 0.1 to 20% of the weight to the record liquid whole quantity in record liquid for aqueous ink jet record containing water soluble dye.

[Claim 5] Record liquid for ink jet record according to claim 4 which a compound of the above-mentioned general formula (I) has an anionic water solubility radical, and is characterized by the number of total carbon being 20 or less.

[Claim 6] an unit expressed with the above-mentioned general formula (II) at least on a base material -- more than 60 mol % -- an image formation method which uses aqueous ink jet record liquid according to claim 4 or 5 for a record medium which has a layer containing an included polymer mordant further at least, and carries out ink jet record.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the image formation method excellent in the light fastness of an image. Furthermore, this invention relates to the image formation method by ink jet record, an ink jet printer, etc.

[0002]

[Description of the Prior Art] In recent years, printers including an ink jet printer have spread quickly with the spread of personal computers. Furthermore, the need of the print system which prints the digitized photograph on the scanner of photograph image quality and a photo CD pan with the spread of digital cameras is increasing quickly. Especially the spread of simple and cheap ink jet printers is remarkable, and the demand to the image quality of the image is also becoming high every year.

[0003] As an ink jet system, many new methods, such as a method which injects much ink with low concentration called photograph ink by small volume, a method which improves image quality using two or more ink in which concentration differs by the same hue, and a method using transparent and colorless ink, are proposed and put in practical use substantially, for example. Print speed is quick especially recently and it is in the orientation for concentration to inject low ink so much.

[0004] As a record medium used for an ink jet recording method, the sheet for record which prepared the ink absorbing layer on the base material called usual paper and a usual ink jet record form was used conventionally. However, when these record sheets were used, there was nothing that can be used in the field of photograph image quality asked for high resolution and high glossiness -- glossiness with many blots of ink is low.

[0005] In order to solve such a problem, the technology of the record sheet for ink jets of using gelatin for an ink absorbing layer by using as a base material resin covering paper which covered both sides of paper with resin, and the so-called RC (resin coat) paper is indicated by JP,4-216990,A, the 6-64306 official report, etc. Moreover, the ink jet record method using the record medium and it which contain synthetic hydrophilicity resin in an ink absorbing layer is indicated by JP,7-179032,A as a method of bringing the appearance and the feel of the image outputted with an ink jet printer close to the conventional photograph. Furthermore, as a method of raising the image quality and stability of the image, gelatin and a basic latex are contained in an ink absorbing layer, and the method using the base material which carried out resin covering is indicated by JP,8-244336,A.

[0006] By amelioration of these systems and a record medium, the image quality of an ink jet has approached the photograph. For this reason, it came to be compared with a photograph also about engine performance other than image quality, and it had become a problem that especially the light fastness of an image is greatly inferior.

[0007]

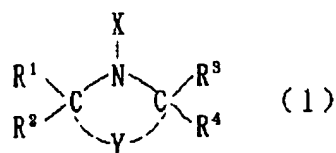
[Problem(s) to be Solved by the Invention] The purpose of this invention is to offer the method of forming the image excellent in light fastness. Furthermore, it is in offering the method of forming the image excellent in light fastness with the printer which prints digital image information, such as an ink jet, the ink jet printer with which the engine performance improved and print speed became quick, and the ink jet printer which improved image quality by injecting many ink drops with thin concentration.

[0008]

[Means for Solving the Problem] Such a purpose was attained by the following means. An ink jet record form characterized by containing a compound expressed with the following general formula (I) all over an ink absorbing layer in which it was prepared on a base material.

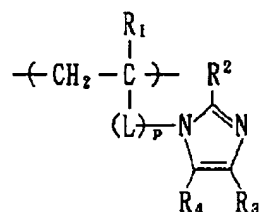
[0009]

[Formula 3]
一般式 (I)



[0010] Y expresses a nonmetal atom group required to form C and 5 - 7 member ring with N among a formula. X expresses an alkyl group, an alkenyl radical, an alkynyl group, an aryl group, an acyl group, a sulfonyl group, a sulfinyl group, an oxy-radical radical, an alkoxy group, an aryloxy group, an acyloxy radical, or a hydroxyl group. R¹, R², and R³ And R⁴ You may differ, even if mutually the same, and a hydrogen atom or an alkyl group is expressed respectively. Here, R¹ -R⁴ and any two radicals in Y may join together mutually, and may form 5 - 7 member ring. The ink jet recording paper which the compound of the above-mentioned general formula (I) has an anionic water solubility radical, and is characterized by the number of total carbon being 20 or less. the compound expressed with an ink absorbing layer by the above-mentioned general formula (I), and the unit expressed with the following general formula (II) at least -- more than 60 mol % -- the ink jet record form characterized by containing the included polymer mordant.

[0011]
[Formula 4]
一般式 (II)



[0012] The inside of a formula, R¹, R², R³, and R⁴ The hydrogen atom or the alkyl group could be expressed independently, respectively, and you may branch also with the straight chain. L expresses a divalent connection radical. p is record liquid for aqueosity ink jet record characterized by containing the compound expressed with the above-mentioned general formula (I) 0.1 to 20% of the weight to the record liquid whole quantity in the record liquid for aqueosity ink jet record containing the water soluble dye showing 0 or 1. Record liquid for ink jet record which the compound of the above-mentioned general formula (I) has an anionic water solubility radical, and is characterized by the number of total carbon being 20 or less. the unit expressed with the above-mentioned general formula (II) at least on a base material -- more than 60 mol % -- the image formation method of carrying out ink jet record of containing the compound expressed with the record medium which has a layer containing the included polymer mordant further at least by the above-mentioned general formula (I) 0.1 to 20% of the weight to the record liquid whole quantity using considering-as feature aqueosity ink jet record liquid.

[0013]

[Embodiment of the Invention] This invention is explained below at details. The general formula (I) which can be used for this invention is described in detail. For example, a pyrrolidine ring, a piperazine ring, a morpholine ring, a piperidine ring, etc. are mentioned as a desirable example among a formula (I) as 5 formed of Y - 7 member rings.

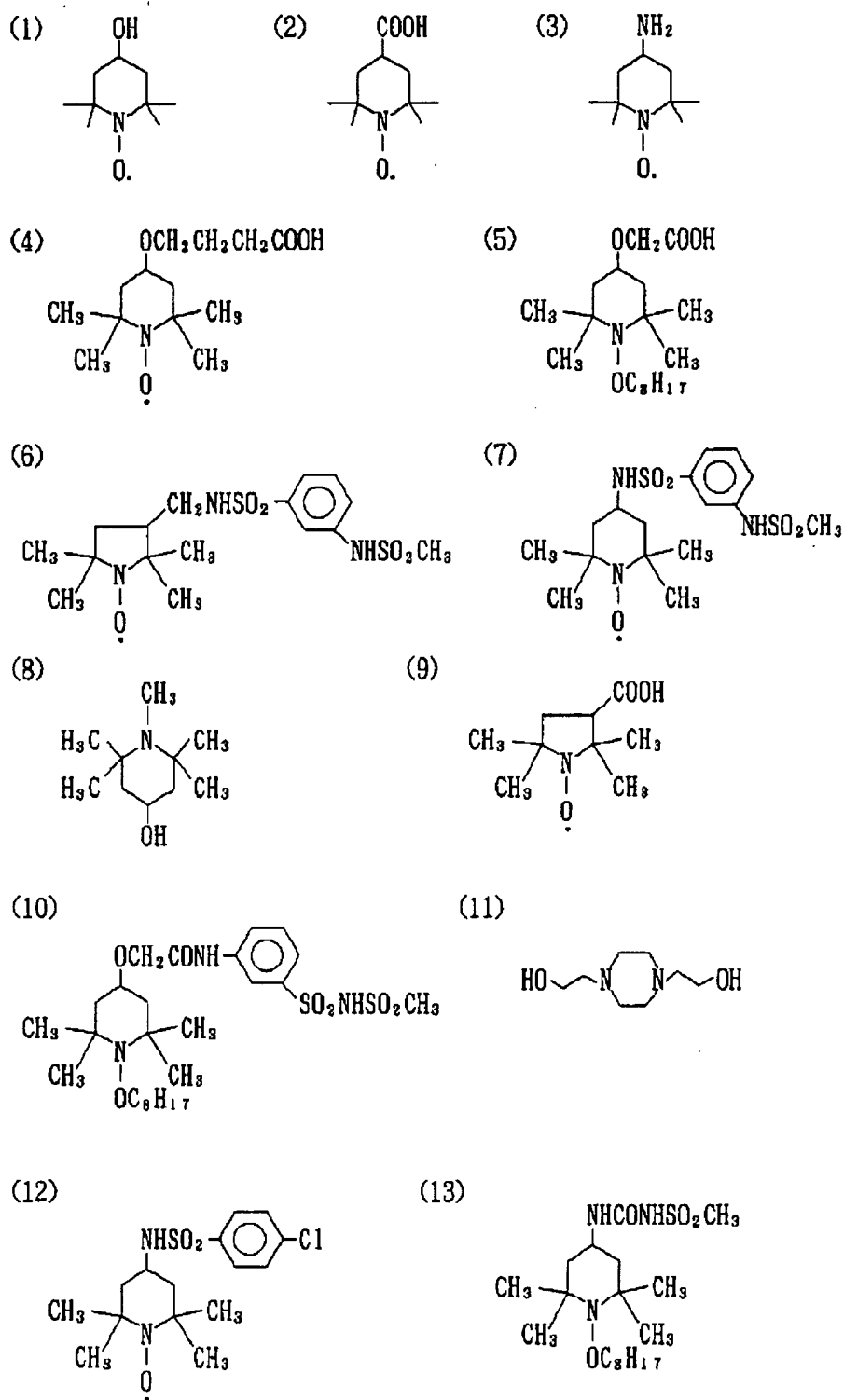
[0014] As an alkyl group expressed with X, for example A methyl group, an ethyl group, n-propyl group, As an iso-propyl group, n-butyl, t-butyl, n-octyl radical, benzyl, a hexadecyl radical, and an alkenyl radical An allyl group, an oleyl radical, etc. for example, as an alkynyl group An ethynyl group etc. for example, as an aryl group A phenyl group, a naphthyl group, etc. as an acyl group for example, as a sulfonyl group [an acetyl group, benzoyl, a PENTA noil radical, etc.] A methane sulfonyl group, a benzenesulphonyl radical, toluene sulfo NIRUKI, etc. for example, as a sulfinyl group A methane sulfinyl group, a benzene sulfinyl group, etc. for example, as an alkoxy group For example, a methyloxy radical, an ethyloxy radical, i-propyloxy radical, n-butyloxy radical, A cyclohexyloxy radical, n-octyloxy radical, t-octyloxy radical, a benzyloxy radical, etc. are mentioned as an aryloxy group, and an acetyloxy radical, a benzoyloxy radical, etc. are mentioned, for example as a phenoxy group and an acyloxy radical, for example. Each of these radicals may have the substituent and a sulfonyl group, a carboxyl group, a hydroxy group, etc. are mentioned as this substituent.

[0015] R1 -R4 A hydrogen atom or an alkyl group (chosen out of the same criteria as the alkyl group of X) is expressed. As for the compound expressed with a general formula (I), it is desirable to have an anionic water solubility radical. An anionic water solubility radical is a radical on which electric dissociation exponent has or more 1 12 or less dissociable group. The value of electric dissociation exponent here expresses the acid dissociation coefficient when dissolving the compound expressed with a general formula (I) in a tetrahydrofuran (THF) / water =6/4 under a room temperature. electric dissociation exponent of an anionic water solubility radical is 12 or less [3 or more] more preferably, and is 11 or less [5 or more] most preferably. As a desirable example of an anionic water solubility radical, the radical containing - OH radical, -SO₃ H set, a -NHSO₂-radical, a phenolic hydroxyl group, a -CONHCO-radical, a -CONHSO₂-radical, a -CON(R)-OH radical, -COOH radical, and a -SO₂ NHSO₂-radical is mentioned. Especially, a -NHSO₂-radical, a phenolic hydroxyl group, a -CONHCO-radical, a -CONHSO₂-radical, and a -SO₂ NHSO₂-radical are more desirable. Moreover, as for the compound expressed with a general formula (I), it is desirable that the number of total carbon is 20 or less.

[0016] Although the example of the compound shown by the general formula (I) below is shown, this invention is not limited to these.

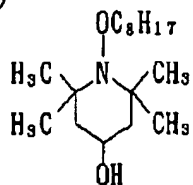
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[Formula 5]

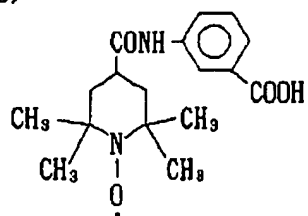


[0018]
[Formula 6]

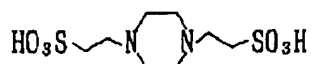
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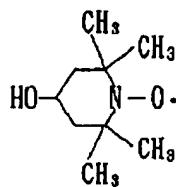
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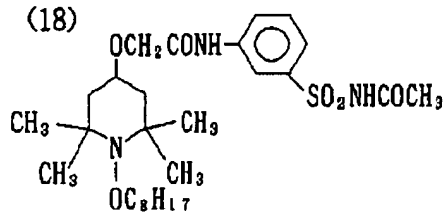
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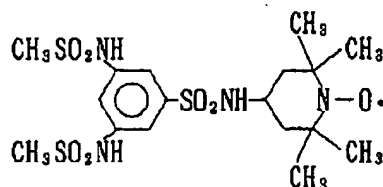
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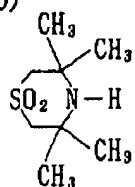
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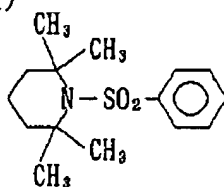
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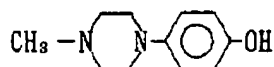
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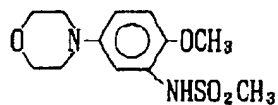
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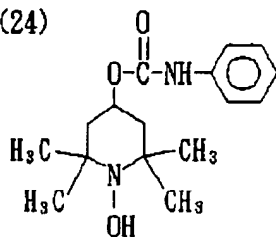
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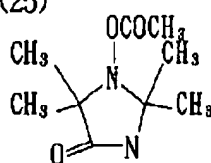
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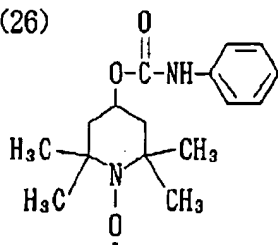
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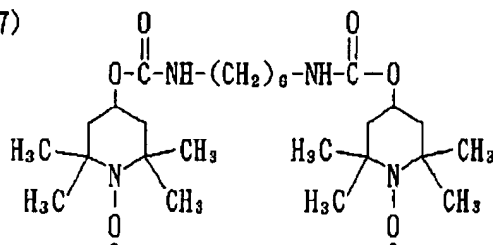
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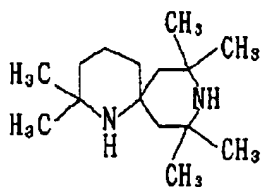


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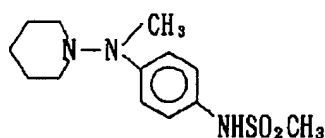


[0019]
[Formula 7]

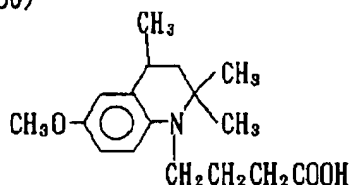
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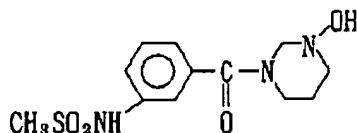
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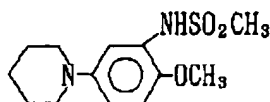
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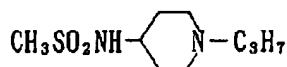
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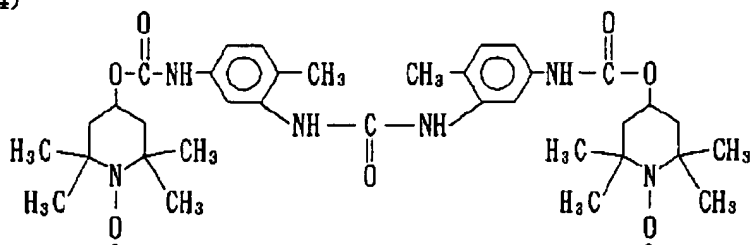
(32)



(33)



(34)



[0020] The compound of this invention is easily compoundable according to a method an organic chemistry composition association magazine, 29 (4), 366 ('71), JP,49-53571,A, 49-53572, 49-53573, 49-53574, JP,49-20974,B, the Europe public presentation patent No. 264,730, and given in U.S. Pat. No. 4,639,415.

[0021] As a method of making the ink absorbing layer of the ink jet recording paper containing the compound of a general formula (I) used for this invention How to dissolve the compound of a general formula (I) in polar solvents, such as water and a methanol, and add to the spreading liquid for ink absorbing layers, How to add the compound molecule of a general formula (I) to a polymer mordant (copolymerization etc.), Although there are the method of adding to the water-soluble polymer which carries out mordanting of the compound of a general formula (I) to a polymer mordant, such as a method and polyvinyl alcohol, and adding, a method by which these were merged, the oil protecting method given in JP,4-125559,A, etc. It is the method of dissolving in the most desirable water or most desirable polar solvent like a methanol, and adding to the spreading liquid for ink absorbing layers. Although the method of adding the compound of a general formula (I) used for this invention in the record liquid for ink jet record can be performed completely like the method which the ink absorbing layer of the ink jet recording paper is made to contain, it is the method of dissolving in the most desirable water or most desirable polar solvent like a methanol, and adding in the record liquid for ink ink jet record.

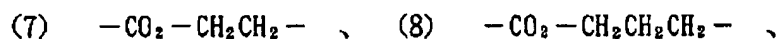
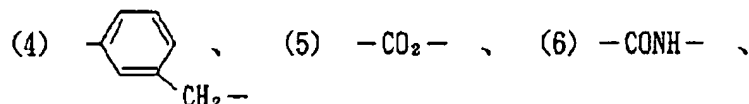
[0022] The compound of the general formula (I) added in an ink absorbing layer and ink jet record liquid may be the form of a precursor. As for the amount of the compound of the general formula (I) added to an ink absorbing layer, it is desirable to add from 0.1 times 100 times to the number of mols of the coloring matter which forms an image. It is desirable to specifically add two times two to 100 mmol/m 0.1 mmol/m all over an ink absorbing layer. They are 0.3 mmol/m² - 30 mmol/m² more preferably. The most desirable ranges are 0.5 mmol/m² - 15 mmol/m².

[0023] The compound of a general formula (II) which can be used for this invention is described in detail. the unit as

which the polymer mordant which can be used for this invention is expressed in a general formula (II) -- more than 60 mol % -- it contains. It sets to a general formula (II) and is R1, R2, R3, and R4. A hydrogen atom or the low-grade alkyl group of 1-6 carbon numbers, for example, a methyl group, an ethyl group, n-propyl group, n-butyl, n-amyl group, n-hexyl group, etc. are expressed independently, respectively, and a hydrogen atom or a methyl group, and especially an ethyl group are desirable. L expresses the divalent connection radical which has the carbon atom of 1 - 20 abbreviation, for example, an alkylene group, a phenylene group, an ant rain radical, etc. The desirable example of a connection radical divalent [these] is shown below.

[0024]

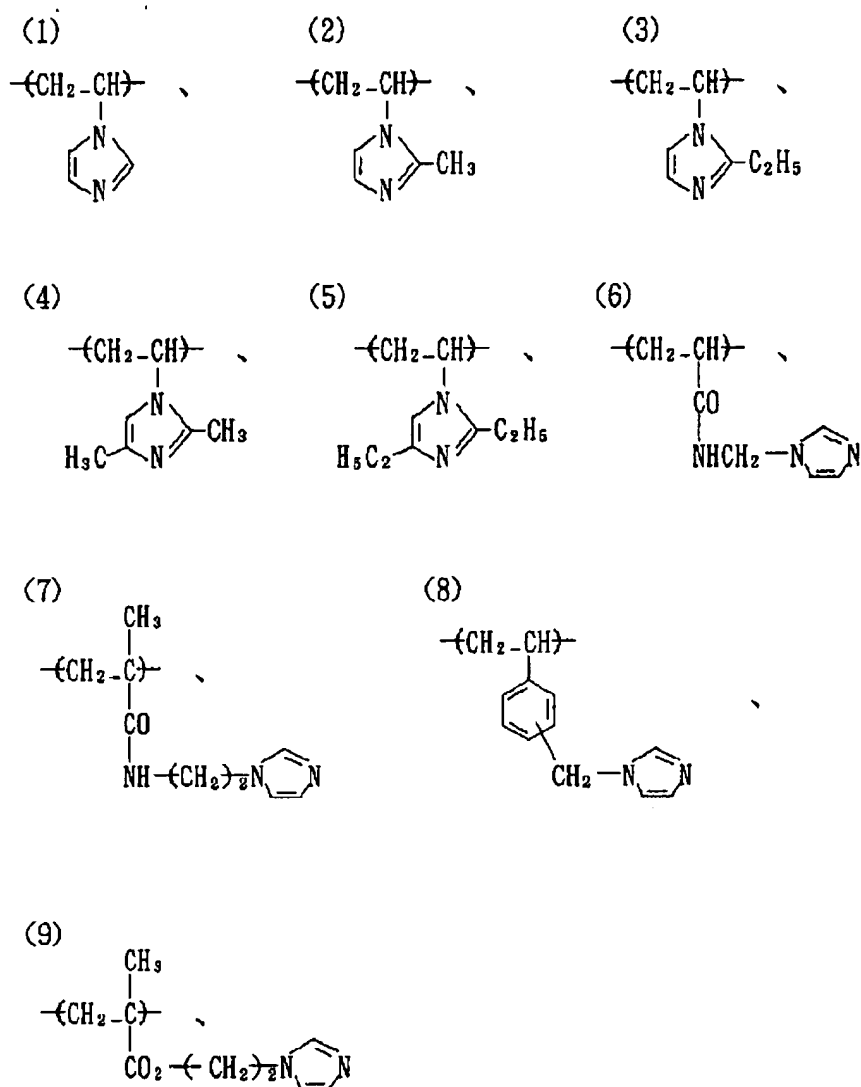
[Formula 8]



[0025] The desirable example of the monomeric unit expressed with the general formula (II) of this invention is shown below. However, it is not necessarily limited to these.

[0026]

[Formula 9]



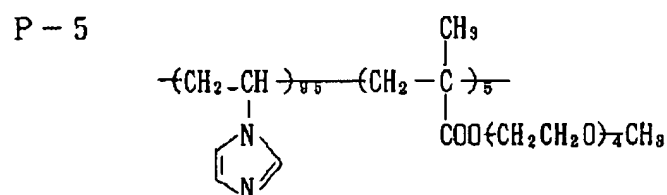
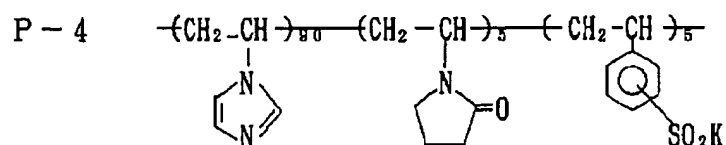
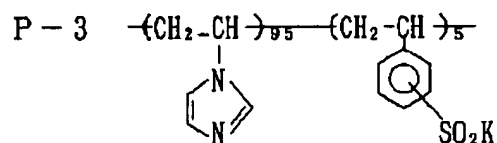
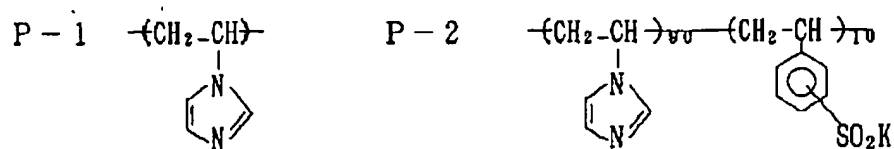
[0027] The polymer mordant which can be used for this invention may also include monomeric units other than a general formula (II), and for example, pyrrolidones, acrylic ester (for example, n-butyl acrylate), methacrylic ester (for example, n-butyl methacrylate), acrylamides (for example, diacetone acrylamide), methacrylamide (for example, n-butyl methacrylamide), and styrene (for example, styrene sulfinic acid) are mentioned as a desirable monomeric unit. Moreover, the comonomer indicated by JP,59-169042,A, JP,62-244036,A, etc. may be contained. Moreover, two or more sorts of these monomeric units may be used.

[0028] The molecular weight of the polymer mordant which can be used for this invention is 5×10^3 to 1×10^7 . It is desirable. If molecular weight is too small, it will become easy to move polymer, and when molecular weight is too large, trouble may be produced in spreading.

[0029] Although the desirable example of the polymer mordant used for below by this invention is shown, this invention is not limited to these. Moreover, two or more sorts may be used together.

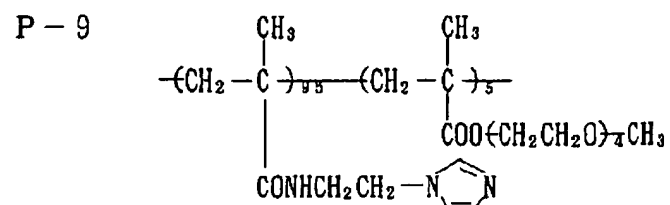
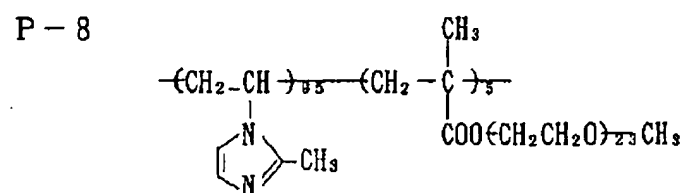
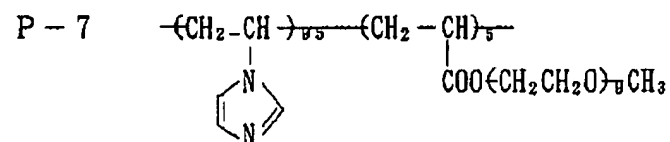
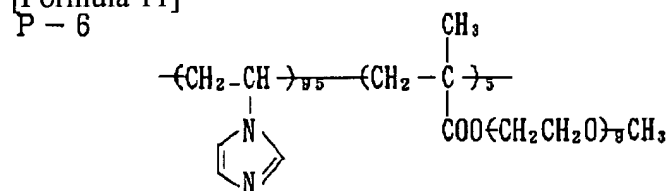
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[Formula 10]



[0031]

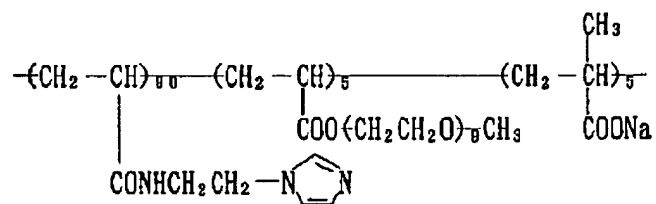
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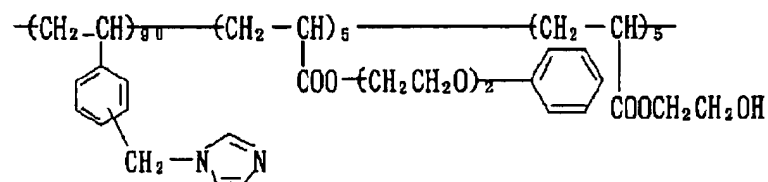
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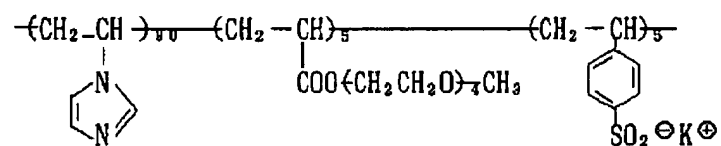
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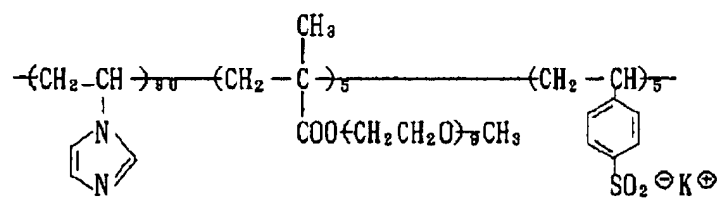
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P-12



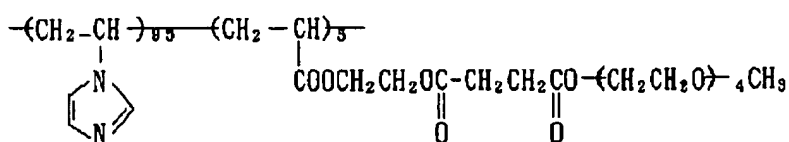
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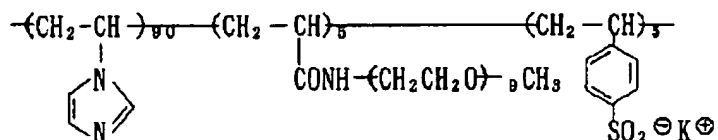
[0033]

[Formula 13]

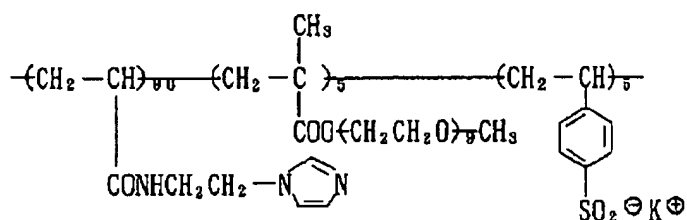
P - 14



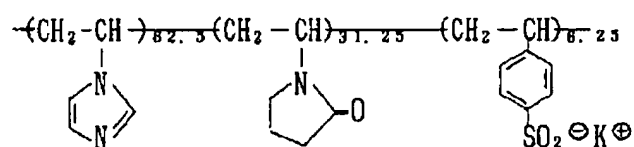
P - 15



P - 16



P - 17



[0034] The synthesis method of these this inventions is indicated by JP,62-244043,A etc., and can be compounded easily.

[0035] Moreover, although this contractor can define the coverage of a polymer mordant easily according to the class of the amount of a color, and polymer mordant, a presentation, etc., about 0.2 - about 30 g/m² are suitable for it, and it is desirable to use it by 0.5 - 15 g/m² especially. In that case, 0.5-50 micrometers of thickness are desirable, and its 1-50 micrometers are still more desirable. Although the record medium of this invention should just have this mordanting layer further at least, it can prepare auxiliary layers which have a fluorescent brightener for a protective layer and white amelioration if needed, such as a layer and a curl prevention layer. It is effective especially to prepare the layer which has a fluorescent brightener for a protective layer and white amelioration. The thickness of the whole enveloping layer which doubled the mordanting layer and the auxiliary layer has 3 micrometers or more desirable 50 micrometers or less, and 5 micrometers or more its 25 micrometers or less are still more desirable. Moreover, an enveloping layer may be prepared not only in one side of a base material but in both sides.

[0036] An inorganic pigment can be used for the record material of this invention. Especially the class of inorganic pigment is not limited and can use all inorganic pigments. For example, a silica pigment, an alumina pigment, a titanium-dioxide pigment, a zinc oxide pigment, a zirconium oxide pigment, micaceous iron oxide, the white lead, a lead oxide pigment, a cobalt oxide pigment, strontium chromate, a molybdenum system pigment, a smectite, a magnesium-oxide pigment, a calcium-oxide pigment, a calcium-carbonate pigment, a mullite, etc. can be mentioned, and a kind or two sorts or more of things can be used.

[0037] A silica pigment and an alumina pigment are desirable especially. as a silica pigment -- a non-[a spherical silica and] fixed form silica -- any -- ***** -- moreover, dry process, a wet method, and the aerogel method -- you may be a synthetic silica by which method. Moreover, you may be the hydrophobic silica by which surface treatment was carried out with a trimethylsilyl radical, silicone, etc. These are preferably used as a colloid silica. 4mmicro-120mmicro is desirable still more desirable, and the mean particle diameter of the silica pigment used is 4mmicro-90mmicro.

Moreover, although the silica pigment used for this invention may be porosity or there may be, it is desirable that it is more desirable to be porosity, the average pore diameter of a silica pigment particle is 50-500-, and pore volume is 0.5 -

3 cc/g. [no]

[0038] as an alumina pigment -- an anhydrous alumina and hydrated alumina -- all are used preferably. As an anhydrous alumina, the alumina of alpha-, beta-, gamma-, delta-, zeta-, eta-, theta-, kappa-, rho-, chi-, and which crystal mold can be used. as hydrated alumina -- monohydrate -- all can be used preferably 3 hydrate. Pseudo-boehmite, boehmite, and a diasore can be mentioned as monohydrate. as three hydrates -- a jib -- a site and bayerite can be mentioned. Hydrated alumina is preferably used also in these aluminas pigment. 4mmicro-300mmicro is desirable still more desirable, and the mean particle diameter of the alumina pigment used is 4mmicro-200mmicro. Moreover, although the alumina pigment used for this invention may be porosity or there may be, it is desirable that it is more desirable to be porosity, the average pore diameter of an alumina pigment particle is 50-500-, and pore volume is 0.3 - 3 cc/g. [no]

[0039] Although especially the synthesis method of hydrated alumina is not limited, the sol gel process which ammonia is added [sol gel process], for example to aluminum salting in liquid, and produces precipitate, the method of hydrolyzing ulmin acid alkali, etc. can be taken. Moreover, heating dehydration of these can be carried out and it can also be used as an anhydrous alumina pigment.

[0040] By making an enveloping layer contain these inorganic pigments, an enveloping layer can be porosity-ized and rate of absorption of ink can be made very quick. Consequently, image quality improves and the problem of imprinting on other paper and other bodies which ink piled up is solved.

[0041] As for the rate of swelling by the water of the whole enveloping layer, it is desirable that it is [100% or more] 1000% or less, and it is still more desirable that it is [150% or more] 500% or less. The rate of swelling is the value which multiplied by 100 what broke the swelling value when water is dropped by desiccation thickness here. It is very important to control a swelling action, when controlling the penetration and breadth of ink, and when preventing the blemish within a printer etc. As for the film surface pH of a record medium, it is desirable from a viewpoint of the shelf life of a record medium, and safety that it is nine or less. The film surface pH said here is the value which trickled the water of 40micro liter into the spreading side of a record medium, and measured pH of 1 minute after.

[0042] The thing of hydrophilicity is preferably used for the binder of the mordant content layer which constitutes a record medium, and other layers. As the example, what was indicated by the (26) page - (28) page of JP,62-253159,A is mentioned. Specifically, a natural compound like [transparence or a hydrophilic translucent binder is desirable for example,] polysaccharide, such as protein, such as gelatin and a gelatin derivative, or a cellulosic, starch, gum arabic, a dextran, and a pullulan, and polyvinyl alcohol, a polyvinyl pyrrolidone, an acrylamide polymer and other synthetic high polymers are mentioned. Moreover, a copolymer (for example, sodium methacrylate, methacrylic-acid ammonium, SUMIKAGERU L-5H by Sumitomo Chemical Co., Ltd.) with the homopolymer of the vinyl monomer which has the high absorptivity polymer of a publication, i.e., -COOM, and -SO₃ M (M is a hydrogen atom or alkali metal), these vinyl monomers, or other vinyl monomers is also used for JP,62-245260,A etc. Two or more sorts of these binders can be combined, and they can also be used.

[0043] A binder may be added in the mordanting layer of the record medium of this invention. As a binder used, although the above-mentioned hydrophilic binder can be used widely, polyvinyl alcohol and its derivative are desirable, and, as for 90% or less, especially whenever [saponification / of polyvinyl alcohol] is desirable.

[0044] A mat agent can be used for the record medium of this invention. As a mat agent, a well-known thing can be used conventionally. A mat agent may be set to a photograph technical field, is known, and can be defined as being inorganic [which can be distributed in a hydrophilic organic colloid binder], or the discontinuity solid particulate of an organic material. As an example of an inorganic mat agent, it is a silver halide particle (an iodine atom is slightly better still in close as a halogen component at a silver chloride, a silver bromide, etc.), glass, etc. which do not form oxides (for example, a silicon dioxide, titanium oxide, a magnesium oxide, an aluminum oxide, etc.), alkaline-earth-metal salts (for example, a sulfate, a calcium carbonate, etc.), and an image. In addition, West German JP,2,529,321,B, the British patent No. 760,775, Said 1,260,772 numbers, U.S. Pat. No. 1,201,905, said 2,192,241 numbers, Said 3,053,662 numbers, said 3,062,649 numbers, said 3,257,206 numbers, Said 3,322,555 numbers, said 3,353,958 numbers, said 3,370,951 numbers, Said 3,411,907 numbers, said 3,437,484 numbers, said 3,523,022 numbers, said -- No. 3,615,554 -- said -- No. 3,635,714 -- said -- No. 3,769,020 -- said -- No. 4,021,245 -- said -- the inorganic mat agent indicated by No. 4,029,504 etc. can also be used.

[0045] Moreover, they are starch, cellulose ester (for example, cellulose acetate propionate etc.), cellulose ether, synthetic resin (for example, ethyl cellulose etc.), etc. at the example of an organic mat agent. as the example of synthetic resin -- water -- insoluble or poorly soluble composition polymer -- it is -- for example, alkyl (meta) acrylate - Alkoxy alkyl (meta) acrylate, GURISHI silyl (meth)acrylate, Acrylamide, vinyl ester (for example, vinyl acetate), acrylonitrile, (Meta) Independent or combination, such as an olefin, styrene (for example, ethylene etc.),

benzoguanamine, and a formaldehyde condensate, Or the polymer which uses combination of these, an acrylic acid, a methacrylic acid, alpha, beta-partial saturation dicarboxylic acid, hydroxyalkyl (meta) acrylate, sulfoalkyl (meta) acrylate, a styrene sulfonic acid, etc. as a monomer component can be used. In addition, an epoxy resin, nylon, a polycarbonate, phenol resin, a polyvinyl carbazole, a polyvinylidene chloride, etc. can be used. In addition, the British patent No. 1,055,713, U.S. Pat. No. 1,939,213, Said 2,221,873 numbers, said 2,268,662 numbers, said 2,322,037 numbers, Said 2,376,005 numbers, said 2,391,181 numbers, said 2,701,245 numbers, Said 2,992,101 numbers, said 3,079,257 numbers, said 3,262,782 numbers, said -- No. 3,443,946 -- said -- No. 3,516,832 -- said -- No. 3,539,344 -- said -- No. 3,591,379 -- said -- No. 3,754,924 -- said -- the mat agent indicated by No. 3,767,448, JP,49-106821,A, 57-14835, etc. can be used.

[0046] Especially, polymethylmethacrylate (for example, SG-6 of the total product made from *****), Benzoguanamine formaldehyde condensation polymer (for example, a trade name EPO star; Nippon Shokubai Kagaku Kogyo Co., Ltd. make : existing chemical substance 7-31 grade), Polyolefine (for example, trade name flow bead LE-1080, CL-2080, the product made from HE-5023; iron-manufacture chemistry, or trade name CHEMIPEARL V-100; product made from the Mitsui petrochemistry), Polystyrene beads (mol tex company make), a nylon bead (mol tex company make), an AS resin bead (mol tex company make), an epoxy resin bead (mol tech company make), polycarbonate resin (mol tech company make), etc. are desirable. The alkali fusibility polymer which has alkali meltable mat agents, such as JP,53-7231,A, 58-66937, and methacrylic acid alkyl / methacrylic acid copolymer given in 60-8894, and an anionic radical given in JP,58-166341,A as an alkali fusibility mat agent can also be used. These mat agents may use together. For example, it is using together a globular form mat agent like polymethylmethacrylate at the mat agent and back layer of an indeterminate form like a silica in concomitant use of two or more sorts of particle powder with which Mohs hardness' differs, concomitant use of two or more sorts of globular form mat agents from which mean particle diameter's differs, and a mordanting layer etc.

[0047] Moreover, the configuration layer (a back layer is included) of the record medium of this invention may be made to contain a silica, especially a colloid silica for the purpose, such as amelioration of an adhesive property-proof, amelioration of film reinforcement, amelioration of curl balance, and rate-of-absorption amelioration of ink. As for the colloid silica, mean particle diameter is a silicon dioxide in 7mmicro-500mmicro, and the principal component may contain the alumina or the sodium aluminate as a little component. Moreover, organic salt like inorganic bases, such as a sodium hydroxide, a potassium hydroxide, a lithium hydroxide, and ammonium hydroxide, or tetramethyl ammonium ion as a stabilizer may be included in these colloid silicas. Especially as a stabilizer of a colloid silica, a potassium hydroxide or the colloid silica which consists of ammonium hydroxide is desirable. these colloid silica -- for example, the volume IGON and for MATEJIE Vic (Egon Matijevic) and Sir FISU and -- Colloid It is stated to the 6th volume of Science (Surface and Colloid Science), and 3-100 pages (1973, John wheelie , and SANSU (John Wiley & Sons)) at details. As a concrete example of a colloid silica, they are Du Pont [E.I.do pont Nemours & Co (USA) and Ludox from J. AM, Ludox AS, Ludox LS, Ludox TM, Ludox They are trade names, such as HS. From Nissan Chemistry (Japan, Tokyo) by the trade name of the Snow tex 20, the Snow tex C, the Snow tex N, the Snow tex O, etc. Monsanto From Co and (USA), it is Syton. C-30, Syton It is the trade name of the 200th grade. Moreover, Nalco From CO (USA), they are Chem and Nalcoag. 1030 Nalcoag 1060 Nalcoag What is being marketed by the trade name of ID-21-64 grade is mentioned. The desirable amount of the colloid silica used is 0.05-5.0 in a dry weight ratio to the amount of solid content of a configuration layer, and is 0.2-2.5 especially preferably.

[0048] In this invention, in order to prevent putrefaction of the dispersion liquid of various chemicals or spreading liquid, it is desirable to use a ***** motorcycle agent for a record medium. If it is a water-soluble thing as a ***** motorcycle agent used in this invention, although it is good, anything Specifically A thiazolyl benzimidazole system compound, an iso thiazolone system compound, A chlorophenol system compound, a BUROMO phenol system compound, thiocyanic acid and an iso CHIAN acid system compound, An acid azide system compound, diamond gin and a triazine system compound, a thiourea system compound, An alkyl guanidine compound, quarternary ammonium salt, organic tin and an organic zinc compound, A cyclohexyl phenol system compound, an imidazole, and a benzimidazole system compound, There are the various ** bacteria agents and antifungal agents which are represented by activity HAROBEN system compounds, such as a sulfamide system compound, chlorination isocyanuric acid, and sodium, a chelating agent, a sulfurous-acid compound, and penicillin, such as an antibiotic. Moreover, in addition to this, they are the L.E waist (L. E. West) and water. Quality Criteria (Water Quality Criteria) Phot.Sci. and Germicide; JP,57-8542,A of Eng., Vol9, and No6 (1965) publication, 58-105145, 59-126533, 55-111942, a ***** motorcycle agent [given in 57-157244] given in ***** motorcycle agent; Horiguchi **** "chemistry of antimicrobial mildewproofing" (Showa 57 Sankyo Publishing), etc. can be used.

[0049] There is no limit special to the hardening agent used for the record medium of this invention. A well-known

hardening agent, For example, an aldehyde system (formaldehyde, a glyoxal, guru tar DEHIDO, etc.), an aziridine system (for example, the PB report 19,921 and U.S. Pat. No. 2,950,197 --) Each specification of 2,964,404, 2,983,611, and 3,271,175, A thing given in each official report of JP,46-40898,B and JP,50-91315,A, An isoxazole system (for example, thing given in a U.S. Pat. No. 331,609 specification), An epoxy system (for example, U.S. Pat. No. 3,047,394 and the West German patent No. 1,035,663) Each specification of the British patent No. 1,033,518, a thing given in JP,48-35495,B, a vinyl sulfone system (for example, 1, 3, and 5-thoria KURIRO nitril-hexahydro-s-triazine --) a screw (vinyl sulfonyl) methyl ether, N, and N-ethylene-screw (vinyl sulfonyl acetamido) ethane, N, and N'-trimethylene-screw (vinyl sulfonyl acetamido) etc. -- moreover -- for example The PB report 19,920, the West German patent No. 1,100,942, said 2,337,412 numbers, Said 2,545,722 numbers, said 2,635,518 numbers, said 2,742,308 numbers, Said 2,749,260 numbers, the British patent No. 1,251,091, Japanese Patent Application No. No. 54236 [45 to], A thing given in each specification of 48-110996, U.S. Pat. No. 3,539,644, and 3,490,911, An acryloyl system (for example, Japanese Patent Application No. No. 27949 [48 to], a thing given in each specification of U.S. Pat. No. 3,640,720), a carbodiimide system (for example, a U.S. Pat. No. 2,938,892 number -- said -- No. 4,043,818) Each specification of said 4,061,499 numbers, JP,46-38715,B, A thing given in Japanese Patent Application No. No. 15095 [49 to], a triazine system (for example, 2 and 4-dichloro-6-hydroxy-S-triazine etc.) Moreover, for example, the West German patent No. 2,410,973, said 2,553,915 numbers, Each specification of U.S. Pat. No. 3,325,287, a thing given in JP,52-12722,A, N-methylol system (a dimethylolurea, methylol dimethylhydantoin, etc.), dioxane derivatives (2, 3-dihydroxy dioxane, etc.) and a mucohalogenic acid system (mucochloric acid --) The hardening agent of dialdehyde starch, such as a muco phenoxy KURORU acid, 1-Krol-6-hydroxy thoriadinyll-ized gelatin, a maleimide system, acetylene series, and a meta-sulfonate system can be used.

[0050] Moreover, the polymer which has the aldehyde group of a publication in a U.S. Pat. No. 3,396,029 number as a macromolecule hardening agent, for example (for example, copolymer of an acrolein etc.), The polymer which has the dichloro triazine radical of a publication in 3,362,827, research disk ROIJA No. (1978) 17333, etc., The polymer which has the epoxy group of a publication in U.S. Pat. No. 3,623,878, Research disk ROIJA No. (1978) 16725, U.S. Pat. No. 4,161,407, The polymer which has the radical which can serve as an activity vinyl group of a publication or its precursor in JP,54-65033,A, a 56-142524 official report, etc., the polymer which has the activity ester group of a publication in JP,56-66841,A are mentioned. Although the addition of a hardening agent is arbitrary, although it can react with a hardening agent among configuration materials, about 0.01 to 30 wt%, especially 0.1 - 10wt% is usually suitable.

[0051] Surfactants various for the purpose, such as a spreading assistant, detachability amelioration, slide nature amelioration, and electrification prevention, can be used for the configuration layer of a record medium. The example of a surfactant is indicated by JP,62-173463,A, 62-183457, etc. Moreover, an organic fluoro compound may be included for the above-mentioned purpose. As an example of representation of an organic fluoro compound, hydrophobic fluorine compounds, such as solid-state-like fluorine compound resin, such as oil-like fluorine system compounds, such as a fluorochemical surfactant indicated by the 8-17th columns of JP,57-9053,B, JP,61-20994,A, 62-135826, etc. or a fluorine oil, or tetrafluoroethylene resin, are mentioned.

[0052] A high-boiling point organic solvent can be used for the configuration layer of a record medium for the purpose, such as a spreading assistant, detachability amelioration, slide nature amelioration, and electrification prevention. There are some which were specifically indicated by (25) pages of JP,62-253159,A, 62-245253, etc. Furthermore, various silicone oil (all silicone oil to the denaturation silicone oil which introduced various kinds of organic radicals into dimethylsiloxane from dimethyl silicone oil) can be used for the above-mentioned purpose. As the example, various denaturation silicone oil, especially carboxy denaturation silicone (trade name X-22-3710), etc. of a publication are effective in "denaturation silicone oil" engineering-data P6-18B of the Shin-etsu Silicone issue. Moreover, the silicone oil of a publication is also effective in JP,62-215953,A and 63-46449.

[0053] The configuration layer (a back layer is included) of a record medium can be made to contain polymeric latex various for the purpose of film physical-properties amelioration of dimension stabilization, curl prevention, adhesion prevention, crack prevention of a film, etc. Specifically, all of the polymeric latex of a publication can be used for JP,62-245258,A, 62-1316648, 62-110066, etc. If the low (40 degrees C or less) polymeric latex of a glass point move is especially used for a mordanting layer, crack prevention / curl amelioration of a mordanting layer can be performed, and if a glass transition point uses high polymeric latex for a back layer, the curl prevention effect will be acquired.

[0054] It may use together with the compound expressed with a general formula (I) in the configuration layer of a record medium, and a fading inhibitor may be used for it. As a fading inhibitor, there is an antioxidant, an ultraviolet ray absorbent, or a metal complex of a certain kind, for example. As an antioxidant, there are a chroman system compound, a KURAMAN system compound, a phenol system compound (for example, hindered phenols), a

hydroquinone derivative, a hindered amine derivative, and a SUPIRO in out system compound, for example. Moreover, a compound given in JP,61-159644,A is also effective. There is a compound of a publication in benzotriazol system compounds (U.S. Pat. No. 3,533,794 etc.), 4-thiazolidone system compounds (U.S. Pat. No. 3,352,681 etc.), benzophenone system compounds (JP,46-2784,A etc.), other JP,54-48535,A, 62-136641, 61-88256, etc. as an ultraviolet ray absorbent. Moreover, ultraviolet absorption nature polymer given in JP,62-260152,A is also effective. As a metal complex, there is a compound indicated by a U.S. Pat. No. 4,241,155, these No. 4,245,018 3-36th columns, 3-8th column [of 4,254,195], JP,62-174741,A, and 61-88256 (27) - (29) page, 63-199248, JP,1-75568,A, 1-74272, etc.

[0055] The example of a useful fading inhibitor is indicated by JP,62-215272,A (125) - (137) the page. May make a record medium contain beforehand the fading inhibitor for preventing that a color fades [by which image formation was carried out to the record medium], ink etc. is made to contain it, and you may make it supply it to a record medium from the exterior. The above-mentioned antioxidant, an ultraviolet ray absorbent, and a metal complex may be used combining these comrades.

[0056] A fluorescent brightener may be used for a record medium. It is desirable to make a fluorescent brightener build especially in a record medium, or to make ink etc. contain, and to make a record medium supply from the exterior. as the example -- K -- the volume on Veenkataraman "The Chemistry of Synthetic Dyes" -- the compound indicated by Vth volume Chapter 8, JP,61-143752,A, etc. can be mentioned. More specifically, a stilbene system compound, a coumarin system compound, a biphenyl system compound, a benzoxazolyl system compound, the North America Free Trade Agreement RUTIMIDO system compound, a pyrazoline system compound, a KARUBO styryl system compound, etc. are mentioned. A fluorescent brightener can be used combining a fading inhibitor.

[0057] Although not limited especially as a base material of a record medium in this invention, generally paper and synthetic macromolecule (film) are mentioned. The mixed papermaking and Yankee paper which are specifically made from synthetic-resin pulp and natural pulp, such as a thing which made pigments, such as titanium oxide, contain into polyethylene terephthalate, a polycarbonate, a polyvinyl chloride, polystyrene, polypropylene, polyimide, celluloses (for example, triacetyl cellulose), or these films, the film method synthetic paper further made from polypropylene etc., and polyethylene, a baryta paper, a KOTIDDO paper (especially cast coated paper), a metal, cloth, and glass are used. These can also be used independently and can also be used as a base material which laminated one side or both sides with synthetic macromolecules, such as polyethylene. In addition, the base material of a publication can be used for a JP,62-253159,A (29) - (31) page. The antistatic agent of a hydrophilic binder, a semiconductance metallic oxide like alumina sol or the tin oxide, and carbon black and others may be applied to the surface of these base materials.

[0058] In this invention, the paper and the plastics base material (however, it is desirable making tint attachment colors, such as white pigments, such as titanium oxide and a zinc oxide, cobalt blue, and ultramarine blue, oxidation neodium, contain in polyolefine) which laminated both sides as a desirable base material especially with polyolefines (for example, homopolymers, such as polyethylene, polystyrene, polyethylene terephthalate, and polybutene, the copolymer of the combination of such arbitration, etc.) are desirable.

[0059] Although there is especially no limit about the thickness of a polyolefine layer, there is no 10 and 15 thru/or 50 microns, further 20, or especially 35 microns especially are desirable 100 microns. Although the configuration of arbitration, such as a mirror plane, a thing which gave regular irregularity, and a thing which gave irregular irregularity, is possible for the shape of surface type of polyolefine, as for the field side which applies especially the configuration layer of a record medium, it is desirable that it is a mirror plane. The surface of a polyolefine layer performs surface activity-ized processing of corona discharge treatment, flame treatment, etc., and prepares an under coat if needed, and a configuration layer is applied and used for it on it. Although there is especially no limit about the white pigments which can be included in the polyolefine by the side of a spreading side, titanium oxide and a zinc oxide are desirable, especially anatase mold titanium oxide is desirable, and in order to raise dispersibility, it is desirable to use together with 50% or less of zinc oxide. The amount of the white pigments which polyolefine is made to contain has 5 desirable % of the weight or more, and further 10 thru/or its 50 % of the weight are desirable, and it is desirable. [especially 15% thru/or 30% of]

[0060] About the tint attachment pigment which can be included in the polyolefine by the side of the surface, although there is especially no limit, what can bear coating temperature of 300 degrees C or more, such as cobalt blue, and ultramarine blue, oxidation neodium, is desirable. The amount of the tint attachment pigment used is 0.1 thru/or 3 % of the weight to white pigments. Especially in order to control a surface reflection property, the selection and the amount of the tint attachment pigment used are important. Also in the pigment called ultramarine blue, since a tint changes greatly with a maker or manufacture numbers, it is desirable to prepare and use various pigments so that it may become a required surface reflection property. When a base material is a polyethylene laminated paper containing white

pigments, such as titanium oxide, a back layer has the desirable thing to which it has an antistatic function and surface resistivity becomes below 1012ohm and cm and to do for appearance layout.

[0061] A color given in JP,8-253593,A and a color given in JP,9-26985,A can be used for the color used for the record liquid for ink jet record of this invention as an example. These colors can be used as ink by [, such as distribution,] making it liquefied by encapsulating by dissolution, emulsification distribution, or polymer to remaining as it is or aquosity, and/or an organic solvent. The addition to the ink of these colors is decided by relation with a record medium. For this reason, to yellow, a Magenta, cyanogen, and black ink adjustment, it is desirable in the ink of each color to add 0.5 to 10% of the weight desirably 0.2 to 15% of the weight.

[0062] The example of the solvent which can be used for ink is given to below. The following solvent can be mixed and used. for example,; -- water, methyl alcohol, ethyl alcohol, and n-propyl alcohol -- Isopropyl alcohol, n-butyl alcohol, sec-butyl alcohol, tert-butyl alcohol, isobutyl alcohol, pentyl alcohol, Alkyl alcohol of the carbon numbers 1-10 of hexyl alcohol, heptyl alcohol, octyl alcohol, nonyl alcohol, decyl alcohol, etc.; for example A cyclopentane, a hexane, a cyclohexane, a heptane, an octane, Nonane, Deccan, undecane, dodecane, and trideca non, the aliphatic series or the aromatic hydrocarbons solvent represented with a tetralin, a decalin, benzene, toluene, a xylene, etc.; for example Halogenated hydrocarbon solvents, such as a carbon tetrachloride, a trichloroethylene, tetrachloroethane, and a dichlorobenzene; for example Ethers solvents, such as ethyl ether, butyl ether, ethylene glycol diethylether, and ethylene glycol monoethyl ether; for example Ketones, such as an acetone, a methyl ethyl ketone, methyl propyl ketone, methyl amyl ketone, and a cyclohexanone; for example Ester solvents, such as an ethyl formate, methyl acetate, ethyl acetate, propyl acetate, butyl acetate, phenyl acetate, ethylene glycol monoethyl ether acetate, and ethyl lactate; for example Polyhydric alcohol, such as ethylene glycol, propylene glycol, and a glycerol, ; Various solvents, such as an intramolecular ester system of hydroxy acid systems, such as nitrogen-containing heterocycle systems, such as other amine systems, an amide system, a N-methyl-2-pyrrolidone, and 1,3-dimethyl-2-imidazolidinone, a valerolactone, and a caprolactone, are mentioned.

[0063] Although an effect of the invention will appear greatly if the method of carrying out image formation is used for an ink jet print using the record form containing the ink jet record liquid of this invention, and the polymer mordant of this invention, an effect is acquired by other methods. If it mentions as an example, the paint film which this ink may be made to carry out direct **** of this record medium, may spray this ink on this record medium from the outside, and contains this ink may be built, it may be with heat, and this record medium may be made to imprint a color (sublimation mold hot printing print as an example etc.).

[0064] When performing image formation of this invention using an ink jet print method, a moisturizer and a solubilizer can be contained in the record liquid for ink jet record of this invention if needed. As these moisturizers and a solubilizer, what was indicated by JP,58-27762,B is suitable. Specifically, the thing of **5 - 7 member nitrogen-containing heterocycle type ketone compound combined with a kind and at least one sort of ** aliphatic series sulfone compound, an alicyclic sulfone compound, or an alicyclic sulfoxide compound at least is desirable.

[0065] These compounds show an effect remarkable as a moisturizer and a solubilizer, and even if they add fibrin derivatives, such as the alkylene glycol as a well-known hydrophilic organic solvent, the alkyl ether of alkylene glycol, a carboxylic amide derivative, lactone, dioxy ethylene, a sulfur compound, alcoholic amines, monovalence, bivalence or trihydric alcohol, carbonates, a urea derivative, an ethylene oxide addition product, N-vinyl-2-pyrrolidone oligomer, and hydroxypropylcellulose, etc. conventionally, they do not show reduction of those effects. Moreover, a moisturizer has the operation for the solidification prevention by dryness of coloring matter and other compounds as one of the causes of the blinding of a nozzle.

[0066] Furthermore, as another cause of the blinding of a nozzle, generating of mold and generating of the aggregate by it can be considered, and an antifungal agent is also added. Mold or bacteria survives into all portions, such as ink passage in an ink jet airline printer, a conservation tank, and a nozzle, and if the conditions which were suitable to growth of a nutrient, temperature, humidity, etc. are ready, it will increase remarkably, and mold or bacteria will produce the aggregate which incorporated constituents including generating of a colony, and a color, and will make the cause of blinding.

[0067] When an ink jet print method is used for the image formation method of this invention, there is no limit in the method of an ink jet print, and the image formation method of this invention can be used for it regardless of continuous system and a type on demand. There is no limit also in the method of the arm head of an ink jet, and it is preferably used for all printers including a piezo method, Bubble Jet, a thermal JIETO method, or the method using an ultrasonic wave. The latest advance of an ink jet system is remarkable, for example, many new methods, such as a method which injects much ink with low concentration called photograph ink by small volume, a method which improves image quality using two or more ink in which concentration differs by the same hue, and a method using transparent and

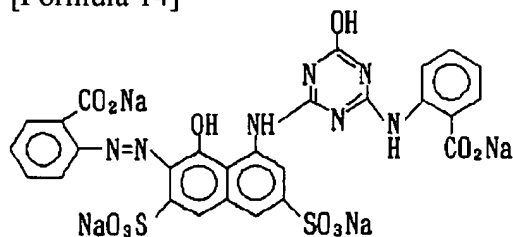
colorless ink, are proposed and put in practical use substantially. Although it has the image formation method of this invention in any [these] method preferably and is, especially print speed is quick, ink with low concentration is injected so much, and the amelioration effect is notably demonstrated in the printer which forms the image near a photograph.

[0068]

[Example] Hereafter, the example of this invention is explained. In addition, the section means the weight section among an example.

<Adjustment of the record liquid -01 for ink jet record> Color 1 The five sections [0069]

[Formula 14]



[0070]

N-methyl pyrrolidone The 20 sections Diethylene glycol The 20 sections Polyethylene glycol (PEG-300) The 5 section Water Heating dissolution of the presentation mixture of the 50 sections above is carried out at 50 degrees C, and it is 0.8 micrometers of average apertures. Microfilter It filtered and the record liquid 100 section for ink jet record made into the purpose was obtained.

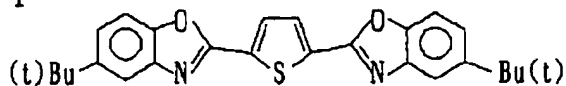
[0071] <creation of the recording paper 101> pulp -- a mixing ratio -- to both sides of the paper of fine quality (152 micrometers in density 1.053 and thickness) of LBKP/NBSP=6/4, polyethylene was laminated at 300 degrees C with the knockout coating method, and the reflective base material was created in them. What mixed shrine ultramarine blue (blue shade and ****) with the titanium which carried out surface treatment to the polyethylene of density 0.923 as white pigments the first **** as a tint attachment pigment was used for the rear face. the thickness of table polyethylene -- 36 micrometers the thickness of reverse side polyethylene -- 27 micrometers it was . The following enveloping layers were painted on the above-mentioned resin covering base material, and the sample 101 was created. In addition, although the key objective of addition of each compound was shown in (), the purpose of addition is not restricted to it.

[0072]

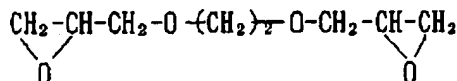
First pass: Alkali treatment gelatin 1.0 G/m2 Compound UV-01 (fluorescent brightener) 0.03 g/m2 A compound H-02 (hardening agent) 0.08 g/m2 Meta-way acid 4 hydrated salt (thickener) 0.10 g/m2 Compound W-04 (surfactant) 0.02 g/m2 Compound F -08 (antiseptics) 0.001 g/m2 [0073]

[Formula 15]

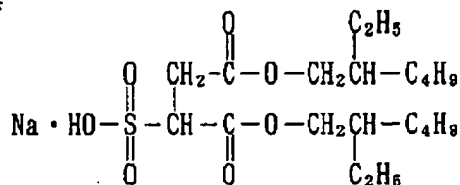
UV-01



H-02

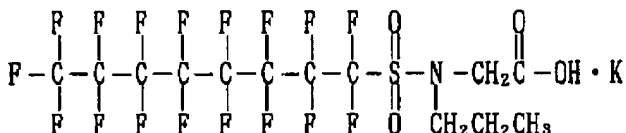
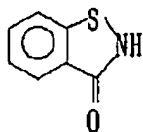


W-04



F-08

W-07



[0074]

The second layer: PVA420 made from polyvinyl alcohol KURARE 7 g/m² Compound W-04 (surfactant) 0.06 g/m²

[0075]

The third layer: Alkali treatment gelatin 0.3 g/m² The total product made from ***** SG-6 (mat agent) 0.18 g/m² (polymethylmethacrylate mean particle diameter of 12 micrometers) Compound W-04 (surfactant) 0.02 g/m² Compound W-07 (surfactant) 0.02 g/m² Compound F-08 (antiseptics) 0.002 g/m² [0076] Next, the record liquid -02 for ink jet record, the record liquid -03 for ink ink jet record, the record liquid -04 for ink ink jet record, and the record liquid -05 for ink ink jet record were created similarly except dissolving the compound (1) of a general formula (I), (2), (3), and (4) in water or a methanol, and the amount of ink jet records adding 5% of the weight in the record liquid -01 for ink jet record.

[0077] Moreover, the recording paper 102 was created to the second layer of the recording paper 101 similarly except adding a compound P-17 two times 2.0 g/m as a polymer mordant. Furthermore, record media 103, 104, 105, and 106 were created to the second layer of the recording paper 102 similarly except adding the compound (1) of a general formula (I), (2), (3), and (4) two times 1 mmol/m.

[0078] After leaving the recording papers 101-106 in a room temperature for after [spreading] one week, it judged in 14.5cm long and 10cm wide postcard size, and the poor image was printed using Epson ink jet printer PM-700C using 05 from the record liquid -01 for ink jet record.

[0079] Xenon light (85,000 luxs) was irradiated to the printed sample for one week using atlas C.I65 weather meter. The image concentration in xenon light exposure order was measured using the reflection density meter (X-Rite310TR), and the robustness over the light of an image was evaluated in quest of the color survival rate. In addition, the color survival rate was searched for according to the following formula.

キセノン光照射前のマゼンタ濃度

$$\text{染料残存率} = \frac{\text{キセノン光一週間照射後のマゼンタ濃度}}{\text{キセノン光照射前のマゼンタ濃度}} \times 100$$

キセノン光一週間照射後のマゼンタ濃度

[0080] Formula 1

These results were shown in a table 1.

[0081]

Table 1	Ink jet record	Ink jet	Color survival rate	** ink number	Recording paper number
*****	*****	*****	*****	*****	*****
** machine	*****	*****	*****	*****	*****
*****	*****	*****	*****	*****	*****

***** machine . *****
 ***** Shoes machine ***** machine .
 ***** machine . ***** [0082]

[Effect of the Invention] As mentioned above, according to this invention, the image excellent in light fastness can be obtained. It can be said to be a big invention result that it comes to be compared with a photograph also about engine performance other than image quality, and light fastness is excellent about the ink jet printer which can acquire the image quality near especially a photograph.

[Translation done.]